N° 24,390 A.D. 1911

Date of Application, 2nd Nov., 1911—Accepted, 4th July, 1912

COMPLETE SPECIFICATION.

Improvements in Drill Mechanism.

I, WILLIAM KING RILEY, of San Bernardino, County of San Bernardino, State of California, United States of America, Miner, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to rock drills and the like; and it refers particularly to an improved automatic feeding means for such drills which obviates all hand operations in feeding the drill.

The invention consists first in improved means whereby the drill is automatically fed forward, the rate of feed depending upon the speed of drilling. For this purpose, the drill itself, that is the cylinder and piston mechanism, is slidably mounted on a frame and is pressed forwardly by the same pressure fluid, preferably air, which operates the cylinder and piston mechanism. The operation of the piston within the cylinder imparts a jar to the cylinder upon each reciprocation; and this jarring action is utilized to feed the drill forward by the provision of a fluid pressure operated frictional holding means which normally prevents the pressure fluid from forcing the piston and cylinder mechanism forwardly but, when there is a jar in a forward direction, will allow the mechanism to move through a short distance. That is to say, the friction tending to hold the main cylinder from advancement will normally hold it stationary in spite of the air pressure tending to move it forwardly, but when the drill is not hitting the bottom of the hole, a good deal of the impact must be taken up by the cylinder head, with the result that the cylinder is jogged along until the drill begins hitting the bottom of the hole again. In practice, the cylinder moves for a very small distance for each stroke of the piston, the frictional means allowing it to move any short distance.

Another feature of my invention is a novel control of this frictional holding means. The fluid pressure operated mechanism operating this frictional holding means, is actuated from the same source of fluid pressure as the means which tends to feed the drill forwardly. Thus, just in proportion as there is pressure tending to feed the drill forwardly, there is friction tending to keep the drill from advancing, which friction is overcome by the jarring movements of the piston above referred to.

Another feature of this invention is the provision of novel means for moving the cylinder and piston mechanism rearwardly when so desired, these means including fluid pressure means acting on a piston within the bore of a rack forming part of the piston and cylinder moving mechanism.

The invention further relates to the combination with said last mentioned means of manually releasable spring catch mechanism for normally preventing the rearward movement of the cylinder and piston mechanism.

An embodiment of the invention is represented in the accompanying drawings in which:—

Fig. 1 is a longitudinal section of portions of my drill, illustrating the interior arrangement thereof.

Fig. 2 is an exterior elevation thereof.

Fig. 3 is a section taken on line 3—3 of Fig. 1.

[Price 8d.]

Fig. 4 is a section taken on line 4—4 of Fig. 3.

In the drawings 5 designates a tubular frame having ways 6 thereon on which a cylinder 7 is adapted to move longitudinally. Cylinder 7 has cylinder heads 9 and 10 at front and rear, these cylinder heads being slidably placed in the ends of the cylinder as is best illustrated in Fig. 1. Near their outer peripheries these cylinder heads have exhaust ports 11. A cylinder sleeve 12 is supported between the cylinder heads 9 and 10, the connection between the sleeve and the heads being such that the heads may move longitudinally to a small extent and still support the sleeve in proper position. In the space between cylinder sleeve 12 and cylinder 7 is a valve sleeve 13. This valve sleeve 13 is provided with pins 14 which are solidly set in the valve sleeve and project through apertures 15 in the cylinder sleeve so that their ends are adapted to be engaged by heads 16 of piston 17. The movements are such that when the piston 17 reaches one end of its stroke, one of the heads will engage with pins 14 to move the valve sleeve 13 to one end of its stroke. In Fig. 1 the piston 17 has just reached the forward end of its stroke and has moved the valve sleeve 13 to the forward end of its stroke. Cylinder sleeve 12 has ports 20 which are adapted to be registered by inlet ports 21 in valve sleeve 13. When so registered, as is shown at the right hand end of Fig. 1, air under pressure (which is fed into space 22 through a pipe 23) will pass through ports 21 and 20 into the interior of cylinder sleeve 12 to act on the piston. At the same time the ports 20 at the other end of the cylinder sleeve are uncovered so that passage is open directly through exhaust ports 11. Thus, in the position shown in Fig. 1, the cylinder is exhausting at the left hand or rear end and is taking air under pressure at the right hand or forward end. Piston 17 will immediately begin its rearward movement.

Piston rod 30 is attached directly to piston 17, passes out through forward cylinder head 9, and has a suitable means 31 for attaching a drill 32 thereto. When the drill is striking the bottom of the hole, the piston 17 will only move to about the position shown in Fig. 1; but when the drill does not hit the bottom of the hole, the piston 17 will move forwardly until it strikes buffer 33. This will cause a jar to be transmitted to the cylinder 7; and it is this jarring action which I utilize to feed the cylinder and piston mechanism forward when the drill is not striking the bottom of the hole with sufficient force or is not striking the bottom of the hole at all. Should the piston 17 strike head 9 with great force, it will force the head 9 outwardly away from cylinder 7. Head 9 is held in place by means of tension rods 40 on the outside of the cylinder, which rods are secured to head 9 and also pass through head 10 and are secured to a plate 41 at their rear ends. A compression spring 42 holds the rods 40 in tension and forces both heads 9 and 10 into the cylinder 7.

Pump rod 50 is attached to the rear end of piston 17 and enters the cylinder 51. The action of this pump rod 50 in the cylinder 51 is to force water down a longitudinal passage 52 in piston 17 and through the piston rod 30 to the drill. Pump rod 50 is also provided with spiral groovings 55 which are acted upon by a suitable mechanism (not shown) to revolve the piston 17 and piston rod 30 and the drill 32. But, as the pump and revolving mechanisms do not enter directly into the present invention, they will not be explained in detail in this specification.

Cylinder 7 has a projection 60 which projects down into tubular frame 5 and is there connected to a hollow rod 61 having gear teeth 62 on its under surface in the form of a rack. The rear portion of tubular frame 5 is perfectly cylindrical and the rear end of hollow rod 61 fits tightly in this tubular portion of the frame, the parts forming in effect a cylinder and piston. Air pressure introduced to the frame 5 through a fixture 65 will have the tendency to push piston 61 forwardly and to move the cylinder 7 and all its mechanism forward.

A pinion 70 engages the gear teeth 62 on the under surface of rod 61 and is adapted to be revolved through the medium of a shaft 71 having squared ends 72. By means of a suitable crank handle the pinion 70 may be revolved

and the cylinder 7 moved in either direction along the frame 5. A brake drum 76 is mounted on shaft 71 and a suitable brake band 77 is provided for engagement therewith. One end of this brake band is fastened at 78 to the casing 79 which surrounds the pinion 70 and brake drum 76 and the other end of the band is secured at 79^a to a piston 80 working in a cylinder 81. One end of this cylinder 81 is supplied with air under pressure through a duct 82 which communicates at 83 with the rear end of the cylindrical portion of frame 5, so that the same air pressure which is directed against the rear end of rod 61 is directed against piston 80 in cylinder 81. The air pressure on piston 80 tends to tighten the brake band 77 about brake drum 76. The tightness of this band, and consequently the amount of friction, may be varied by adjusting the adjusting screw 82^a.

When the machine is in operation and air pressure is supplied to press rod 61 forwardly, it will be seen that the same air pressure simultaneously operates the brake band 77 and causes it to grip tightly on the brake drum. Consequently, in the measure that there is air pressure tending to force the cylinder 7 forwardly, there is friction tending to retard that movement. Adjusting screw 82^a is so placed that the friction is only slightly in excess of the forward pressure on rod 61, so that the jolting actions transferred to the cylinder 7 when the piston 17 reaches the forward end of its stroke and when the drill is not striking the bottom of the drill hole with sufficient force, will have a tendency to move the cylinder 7 forwardly and to advance the drill. This constitutes the automatic forward feed. For moving the drill rearwardly I have provided a stationary piston rod 100 which is solidly anchored at its forward end at the forward end of frame 5 and whose rear end enters the hollow interior of the rod 61. This piston rod 100 is also hollow and air is fed through it through a duct 101, the admission of air being controlled by a small valve 102 operated by a push button 103. When air is admitted to this piston rod it presses against the inner rear end of rod 61 and forces the piston rod 61 and cylinder 7 rearwardly, the air pressure having in the meantime been released from behind rod 61 and piston 80, but before the cylinder 7 can be moved rearwardly the catch mechanism 110 must be released. This catch mechanism is for the purpose of preventing any jolting movement from moving the cylinder 7 rearwardly as well as forwardly and to prevent the striking of the drill on the bottom of the drill hole from forcing the cylinder 7 rearwardly. The catch mechanism consists in a member 111 having an aperture 112 which fits loosely around the cylindrical portion of frame 5 but which is pressed by a spring 113 to the position indicated in Fig. 2, so that it binds upon the frame 5 and prevents the rearward movement of the cylinder 7. After every forward movement of cylinder 7 this device 110 takes a fresh grip of the frame 5 and prevents the rearward movement of the cylinder from its newly acquired position. Pressing downwardly on handle 114 will release this catch mechanism and will allow the cylinder to be moved rearwardly as above described.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In drill mechanism having a frame provided with ways thereon, a cylinder and piston mechanism slidably mounted on the ways and fluid pressure operated means tending to advance the cylinder and piston, the combination of fluid pressure operated friction means adapted to prevent such advance until the piston imparts a jar to the cylinder owing to the drill not striking the bottom of the drill hole or striking with insufficient force, said advancing means and friction means being simultaneously actuated by cooperating means from the same source of power.

2. In drill mechanism of the character defined in Claim 1, a rack and pinion mechanism by which the cylinder and piston may be moved on the frame, a

brake band adapted to prevent the rotation of the pinion; and an adjustable fluid operated piston to set the brake band.

3. Drill mechanism as defined in Claims 1 and 2, having fluid pressure means acting on a piston within the bore of the rack for moving the cylinder and piston mechanism rearwardly on the frame in combination with manually releasable spring catch mechanism normally preventing such rearward movement of said cylinder and piston mechanism.

4. Drill mechanism having its parts arranged, combined and adapted for operation substantially as and for the purpose hereinbefore specified.

Dated this 2nd day of November, 1911.

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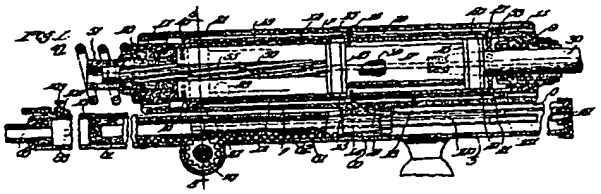
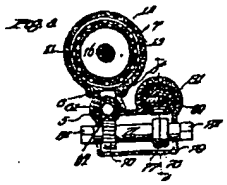
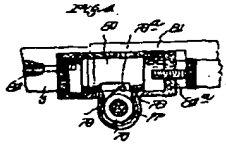
RILEY'S COMPLETE SPECIFICATION.

(2 SHEETS)

SHEET 1.

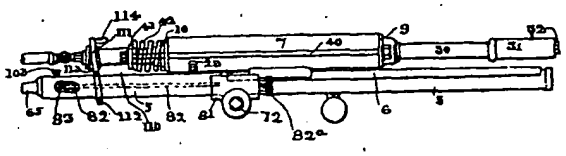






SHEET 2.

Fig.2.



[This Drawing is a reproduction of the Original on a reduced scale]

SHEET 1.

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1.

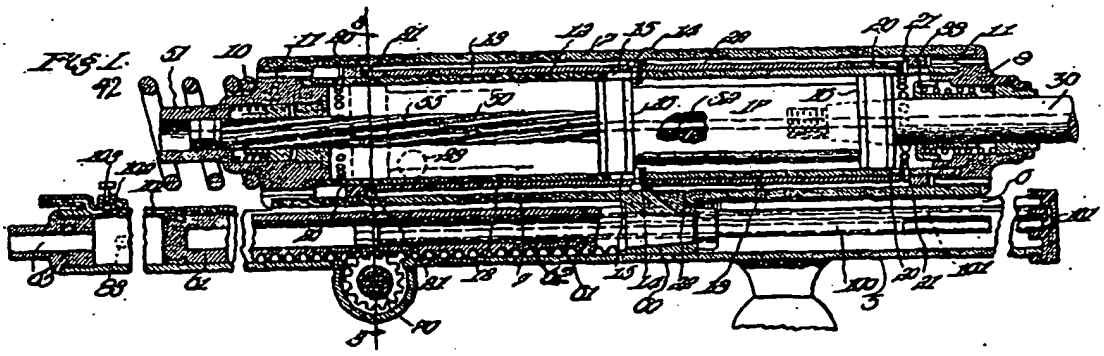


FIG. 2.

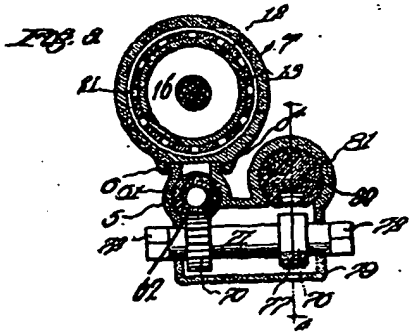


FIG. 4.

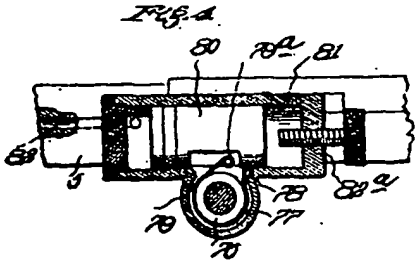
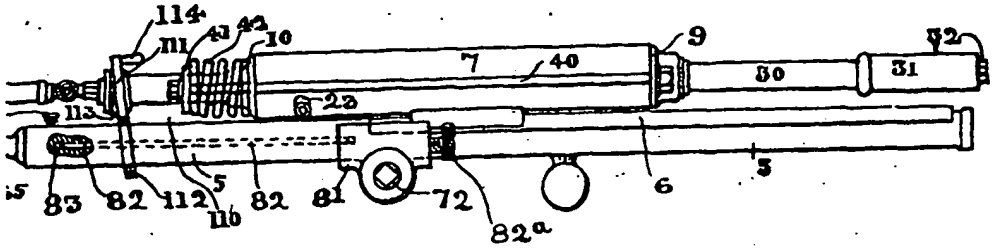


Fig.2.



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